

# NASA TECH BRIEF

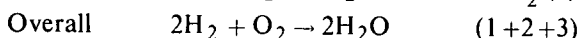
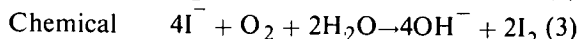
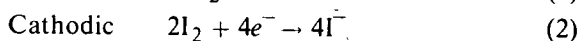
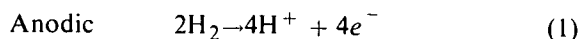


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## Oxygen-Hydrogen Fuel Cell with an Iodine-Iodide Cathode: A Concept

The electrical characteristics of the oxygen electrode in a hydrogen-oxygen fuel cell are improved by use of an iodine-iodide couple. This concept for a new type of fuel cell is based on association of three facts: (1) the iodine-iodide reaction has a very high exchange-current density; (2) iodide ions are very sensitive to oxidation, especially when exposed to light; and (3) a fuel-cathode-reducing iodine has a good chance of success.

A fuel cell has been proposed which uses a porous cathode through which is fed a solution of iodine in aqueous iodide solution; the anode is a hydrogen electrode. The electrolyte coming from the cell is fed to a chemical reactor where iodide ions are oxidized by oxygen in the presence of light; the iodine in solution, formed in this reactor, is then fed to the cathode. The chemical reactions occurring are:



This proposed system has two advantages:

1. No activation polarization appears on the cathode, as on commonly used oxygen electrodes,

because of the very high exchange-current density of the iodine-iodide electrode.

2. Oxygen and hydrogen, the fuels for the two electrodes, are advantageous in the matters of weight, price, and availability; the water produced by the cell reaction is easily removed.

### Notes:

1. This development is in a conceptual stage only; at the time of this publication no model or prototype has been constructed.
2. Requests for further information may be directed to:

Technology Utilization Officer  
Headquarters  
National Aeronautics  
and Space Administration  
Washington, D.C. 20546  
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### Patent status:

No patent action is contemplated by NASA.

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Category 02